

of the two trees for the next few days and found that they had (2-) 3 fertile stamens. Further, a reduced stamen of varying size was also seen in some of the flowers with both 2 or 3 fertile stamens.

This is a new record for *Bauhinia purpurea*. The voucher specimens collected from

the two trees (12.xi.1998, *Bandyopadhyay* 101, 102) have been deposited in CAL.

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37. INTERACTION BETWEEN *ACANTHUS* AND SUNBIRDS AT CORINGA IN ANDHRA PRADESH

Acanthus ilicifolius L., (Acanthaceae) commonly called the spiny, or hollyleaf mangrove, is the best-known species in a closely related group of ground flora mangroves. It is reported to be able to cope with almost all conditions within the mangrove. It occurs typically on littoral margins as a sprawling, vine-like shrub. Usually associated with freshwater influence, it is common in the upper and middle reaches of estuarine rivers and other areas in Coringa, Andhra Pradesh, India.

Acanthus leaves are yellow-green with a margin that is usually, but not always serrate, and prickly. The leaf is glossy, stiff, oblong and lobed, with a short petiole. The flowers are blue with a purple hue. They secrete nectar from a ring at the base of the ovary. The large trilobed lower lip of the corolla forms a landing stage for pollinators. The four stamens surrounding the style have strong filaments, which can only be forced apart by large and powerful biotic vectors. When this occurs, pollen is shed from the anthers onto the vector's body; the receptive stigma also gets powdered with pollen. In effect, self- or cross-pollination takes place. The separated staminal filaments gain their original position when the insect departs. The flowers receive multiple visits because of their original viability and shape. It seems that this floral mechanism is intended for multiple visits so that the legitimate pollinators can effect pollination.

The sunbird species, namely, *Nectarinia asiatica* and *N. zeylonica*, and also large carpenter bees of the genus *Xylocopa* forage for the nectar of *Acanthus* flowers. The birds land on the flowering branch and insert their bill through the staminal column surrounding the style, while the bees use the lower lip of the corolla for landing before probing the flowers like sunbirds. However, sunbirds regularly visit the flowers till they are available. The birds exhibit territoriality by chasing away the intruding bees to exploit the floral source profitably.

Acanthus grows abundantly in the area and serves as a potential nectar source for the sunbirds for 3-4 months from May to August. The interaction between *Acanthus* flowers and sunbirds is symbiotic, and ensures the survival of both partners in the mangrove habitats. However, the occurrence of sunbirds is also dependent on plant species that bloom (and provide nectar to birds) outside of the flowering season of *Acanthus*, as appears to be in the case of *Leonotis nepetifolia* (Aluri and Reddi 1994; Aluri 1998).

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38. FLORAL BIOLOGY AND ECONOMIC VALUES OF *HYPTIS SUAVEOLENS* (L.) POIT. IN MEXICO

The genus *Hyptis* with about 400 species (Hickey and King 1988) is a member of the Subfamily Nepetoideae, Tribe Ocimeae, Subtribe Hyptidinae (Cantino *et al.* 1992). It is Neotropical with only a few weed species extending into the Palaeotropics. Brazil, with over 250 species, is considered the centre of diversity for this genus, with most of them growing as narrow endemics. In Mexico, there are 32 species out of which 22 are endemics (Ramamoorthy and Elliott 1993). *H. suaveolens* has wild and cultivated forms. The wild form is a weedy species and widespread in Mexico, extending its distribution to the Far East of Palaeotropics. The cultivated forms are confined to Mexico. Both forms flower from September to October. The wild flowers are violet with a nectar guide on the upper lip and have anthers and stigma concealed in the carina-like central lobe of the lower lip, set up under tension for explosive release. Foraging bees cause the tense carinal lobe to reflex and explosively release the sex organs, and effect sternotribic pollination (Aluri 1990). The wild form largely differs from the cultivated ones in plant height, stem colour, calyx size, flower colour, manner of carinal lobe releasing the sex organs, seed colour, etc. The cultivated forms are distinguishable into two varieties: i. white flowers with violet nectar guide and ii. white flowers lacking nectar guide. The first form exhibits characters intermediate between the wild and the second form. However, both the cultivated forms release the anthers and stigma passively from the carinal lobe, and contain larger fruiting calyx, requiring an

external agent for seed dispersal. The white form with the nectar guide is found in some provinces of Mexico, while the other is completely confined to the State of Colima. There are no reports on the occurrence of cultivated forms of *H. suaveolens* elsewhere.

Close examination of the wild and cultivated forms shows that the cultivated forms might have originated from the wild due to continuous isolation under human care without sexual reproduction with their natural populations. Although there are morphological and functional differences in the three flower forms, they mate well with each other. The foraging bees also do not discriminate between the violet and white flowers and forage alternately between them, transferring pollen from one form to another throughout their flowering season.

H. suaveolens is locally known as 'Chia' or 'Chan'. Its seeds are used in sauces, and as a thickening agent in the preparation of cookies and biscuits. A traditional drink is also prepared with the seed flour mixed with ice water and honey. It is good for digestion and has a cooling effect on the stomach. 'Chan' ice is also sold in the market. The seeds yield 18-23% protein and 13-23% oil content, indicating their high nutritive value. The oil is used in cooking and is an excellent preservative for colours. The leaves are used as an appetisers, to combat indigestion, stomach pain, nausea, flatulence and cold, for wound healing and skin infections. The leaves also yield an essential oil, which inhibits the growth of fungi such as *Candida albicans* and *Helminthosporium oryzae*, and bacteria such as potato pathogenic bacteria (Pandey *et al.* 1981,